

VAN DOREN

A design for a University Library

Architecture

B. S.

1910

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LIBRARY

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A DESIGN FOR A UNIVERSITY LIBRARY

BY

ROBERT GUY VAN DOREN

THESIS

FOR THE

DEGREE OF BACHELOR OF SCIENCE

IN

ARCHITECTURE

COLLEGE OF ENGINEERING

UNIVERSITY OF ILLINOIS

1910



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UNIVERSITY OF ILLINOIS

May. 31

1900

THIS IS TO CERTIFY THAT THE THESIS PREPARED UNDER MY SUPERVISION BY

ROBERT GUY VAN DOREN.

ENTITLED A DESIGN FOR A UNIVERSITY LIBRARY.

IS APPROVED BY ME AS FULFILLING THIS PART OF THE REQUIREMENTS FOR THE

DEGREE OF BACHELOR OF SCIENCE IN

ARCHITECTURE.

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Instructor in Charge

APPROVED:

N. Clifford Rickard

HEAD OF DEPARTMENT OF

Architecture

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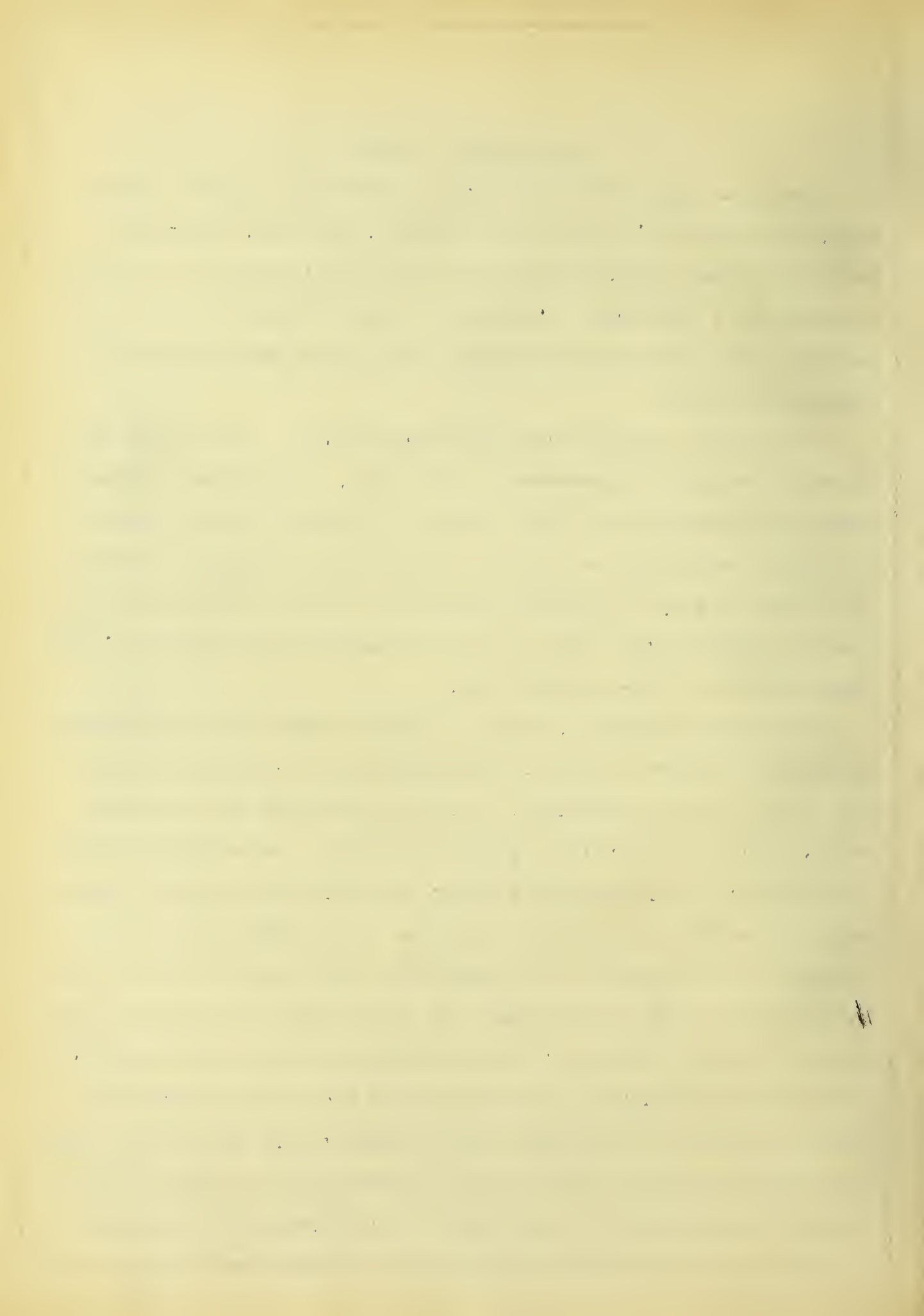
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A UNIVERSITY LIBRARY.

There are three distinct types of libraries - public, reference, and college or university libraries. Each class possesses certain inherent characteristics that must be regarded in the planning of such a building, but these are minor features and do not affect the broad underlying principles that govern the design of all library buildings.

To design a specific building intelligently, it is first necessary to know the requirements of the plan, requirements that will admit of successful use of the finished structure. Before going into details regarding the planning of any particular type, let us review the history of library development to more firmly fix in mind the features that must not be overlooked in the successful library building of the present time.

Library architecture, where it differs from other architecture, is purely a science of today. Its problems are essentially modern and, for us, largely American. So far as interiors are concerned, and exteriors as controlled by interior plans, few buildings before the middle of the Nineteenth Century, and not many even of a later date, are useful as precedent or models in the United States. The library in this country is an institution that has been built up by the practical needs of the public in general and in this way is different from the libraries of other countries, due to the variation in existing conditions. In the records of the civilizations from Assyria to Greece it is found that the tablets and rolls which were the books of antiquity were stored on shelves or in cupboards in rooms of various palaces and temples. The first public libraries,



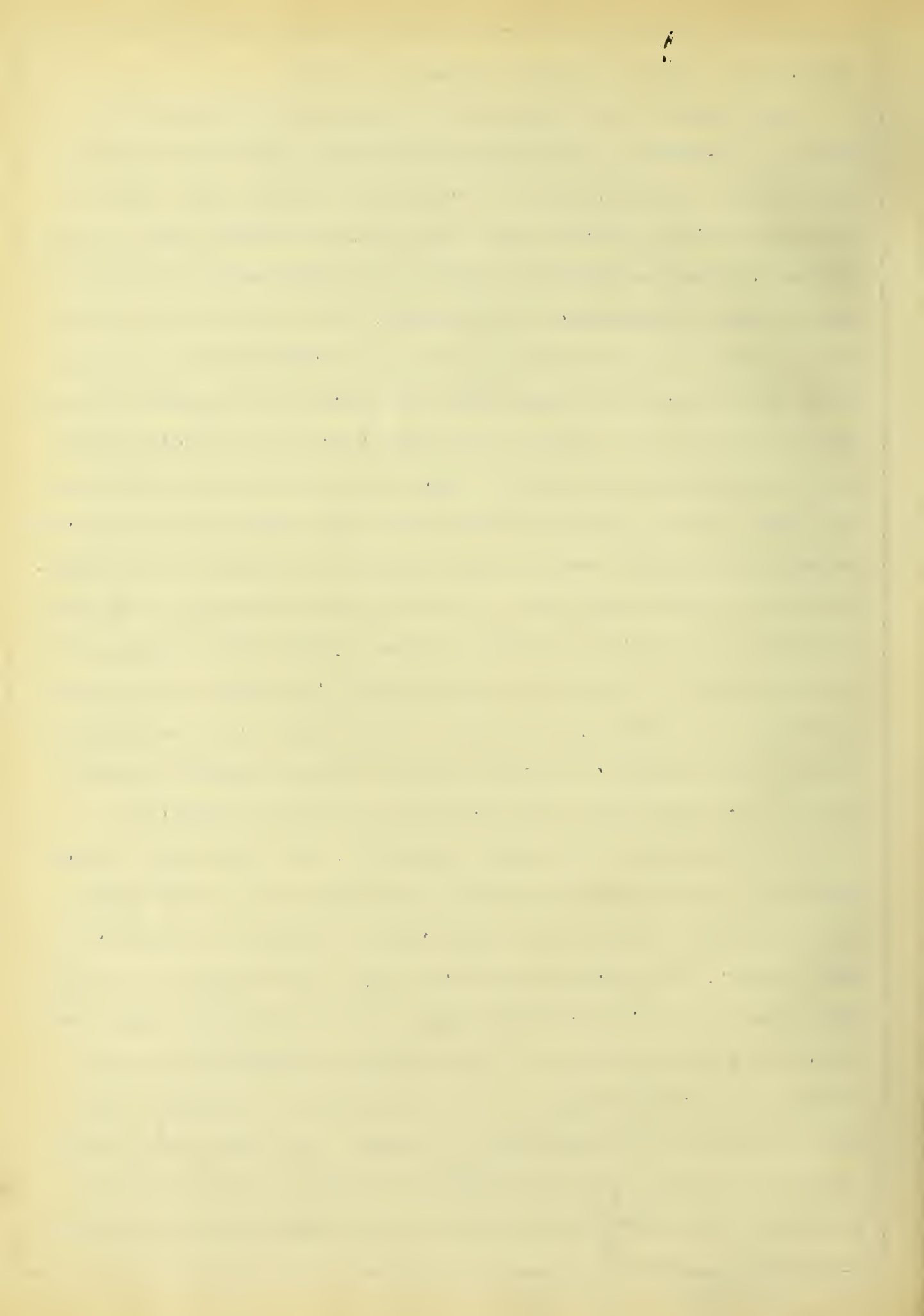
buildings devoted to library purposes alone, were erected in Rome, but little is known of their form, administration, or arrangement. However, going on the assumption that the library of the Vatican was modeled after these earlier institutions, they must have been of little use, entirely unfit for study and, aside from their architectural worth, of little value. About the third century of the Christian Era, an entirely different class of libraries was developed in the monasteries. Beginning with a few manuscripts kept in the cloisters on shelves or in chests, these small monastic collections of service books and theological commentaries, with occasional copies of Greek and Roman classics, developed with time until they were assigned to separate rooms.

The Universities in the middle ages adopted the forms of monastic libraries and developed them into types that have served substantially till the present day. The first method of storing books and manuscripts seems to have been in closed presses or cupboards, the next method came in the shape of open wall shelving and last of all, alcoves. What may be called the College type of library evolved in this gradual process, -long and usually narrow rooms with alcoves on both sides, amply lighted by windows in each alcove, continued to be used and imitated until the beginning of the Nineteenth Century, and ^{may} still be seen in many libraries abroad, and a few in this country. As libraries increased in size, galleries were added to break the height of wall shelving or to add another story to alcoves. Wall shelving, broken by galleries, is exemplified in the Ambrosia library at Milan, the Bodleian library at Oxford, the general and law libraries of All Souls College, Oxford, and in Sir Christopher Wren's library in St. Paul Cathedral. The alcove system is shown in Merton College library at Oxford, the university library

of Cambridge, and the Durham Cathedral library.

The library of the University of Leyden as it was in 1610 shows an interesting exception to the general wall shelving and alcove system, foreshadowing in a remarkable way the floor cases of our modern public library rooms. The library movement began in both England and America about the middle of the Nineteenth Century, and with it came a renaissance in libraries. The old libraries had to face problems of enlargement and change in administrative methods, which were solved very ingeniously. An interesting instance of adapting old forms to new needs can be seen at Trinity College, Dublin. Here the books were arranged in long rows of alcoves and galleries, and these were so crowded that more shelf was imperatively necessary. To get the necessary room without impairing the effect of the interior was a difficult question, at last solved by closing in the open cloisters over which the library had been built, thus getting a lower story about 15 feet high, with lighting from large side windows, containing two story wooden stacks. It was thus that a modification of the latest method of compact storage renders service to a survivor of the impressive but impractical mediaeval libraries.

New experiments now rapidly succeeded. The first type of American libraries was embodied in the former building of the Boston public library, a type still surviving in a number of libraries in this country. The main room is wide, long, and lofty and is lined from floor to ceiling with tier upon tier of alcoves and galleries. A few years of occupation of this building demonstrated so many faults and inconveniences that the plan was soon discarded. Then came the demand for compactness of storage, for easier and quicker service, and this demand was met by a complete change in form. Countless tiers of galleries spread around the sides of an almost



useless central space were abandoned and the form changed to close concentration of most of the books, in the centre or at one side of a group of working and reading rooms so arranged as to minimize space in storage, and time in service. In 1876 Harvard College adopted a feature, the most important of modern libraries and which has affected all plans of library architecture since its invention. This was the "stack system", - the storage of books in a compact cage of metallic shelving with narrow aisles between the shelves, story superimposed upon story to any desired height. The modern American library is expected to provide convenient accommodation and prompt service, which can only be given through every helpful feature of plan, arrangement and equipment which experience can suggest and invention devise. With the larger library such as has been considered in this problem, steel stacks must be used for the storage of the main body of books. With the stack comes the need of bringing all the work rooms and reading rooms into such relation with the main feature, and to each other as will allow the easiest, quickest, and most economical service with the best light everywhere. While electric light devices have modified the evils of dark interiors, it is the general opinion that such methods should be used sparingly and that natural light is greatly to be desired for books as well as for attendants and readers.

A few general statements regarding library building as set forth at a meeting of the American Library Association cover the chief essentials of this class of building. Briefly they are as follows:

1. Every building should be planned especially for the kind of work to be done and the community to be served.
2. Plans should always provide for future growth and arrangement.
3. A library should always be planned for economical administration.
4. Public rooms

should be planned for complete supervision by the fewest possible attendants. 5. There should be no elaborate decoration of reading rooms that will attract sight seers to disturb readers and attendants. 6. Natural light is desirable in all parts of the building, the windows running nearly to the ceiling.

The University Library must of necessity conform to the general requirements of the library in general. While the plan may differ somewhat in the disposition of floor space for purposes connected with the University work, the principles governing the administrative and utilitarian purposes of the building remain very much the same.

The Problem.

The problem as I have chosen it is to design a building for library purposes to adequately provide for the needs of an average American University.

Division of Rooms.

The floor space may be said to be divided into two classes, namely: Rooms devoted to the administration of the library, and the rooms for the use of the students and thier university work in connection with the library.

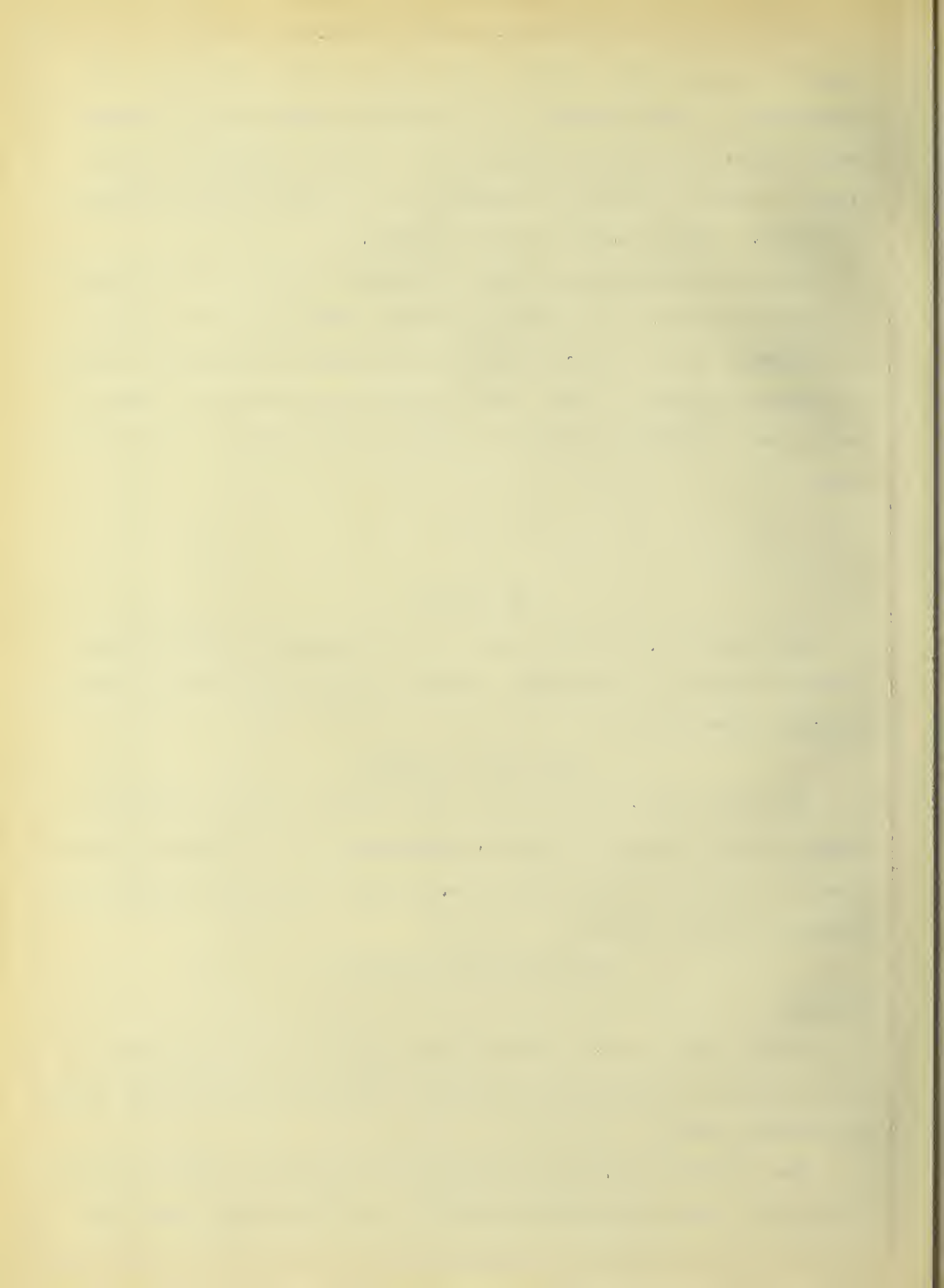
Administrative Quarters.

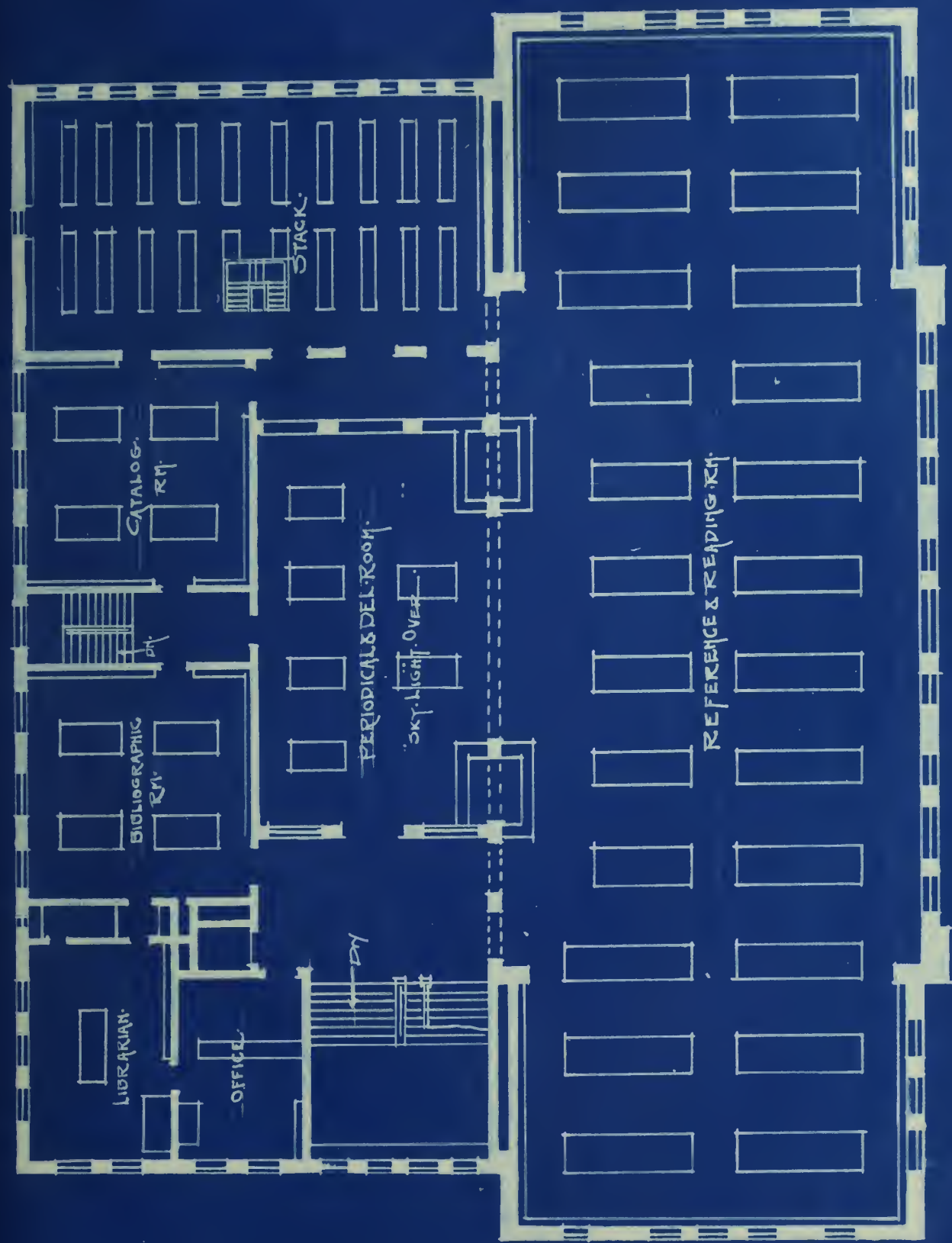
Offices:

Offices are provided for the Librarian and his assistants, placed in close communication with the stacks and the delivery desk.

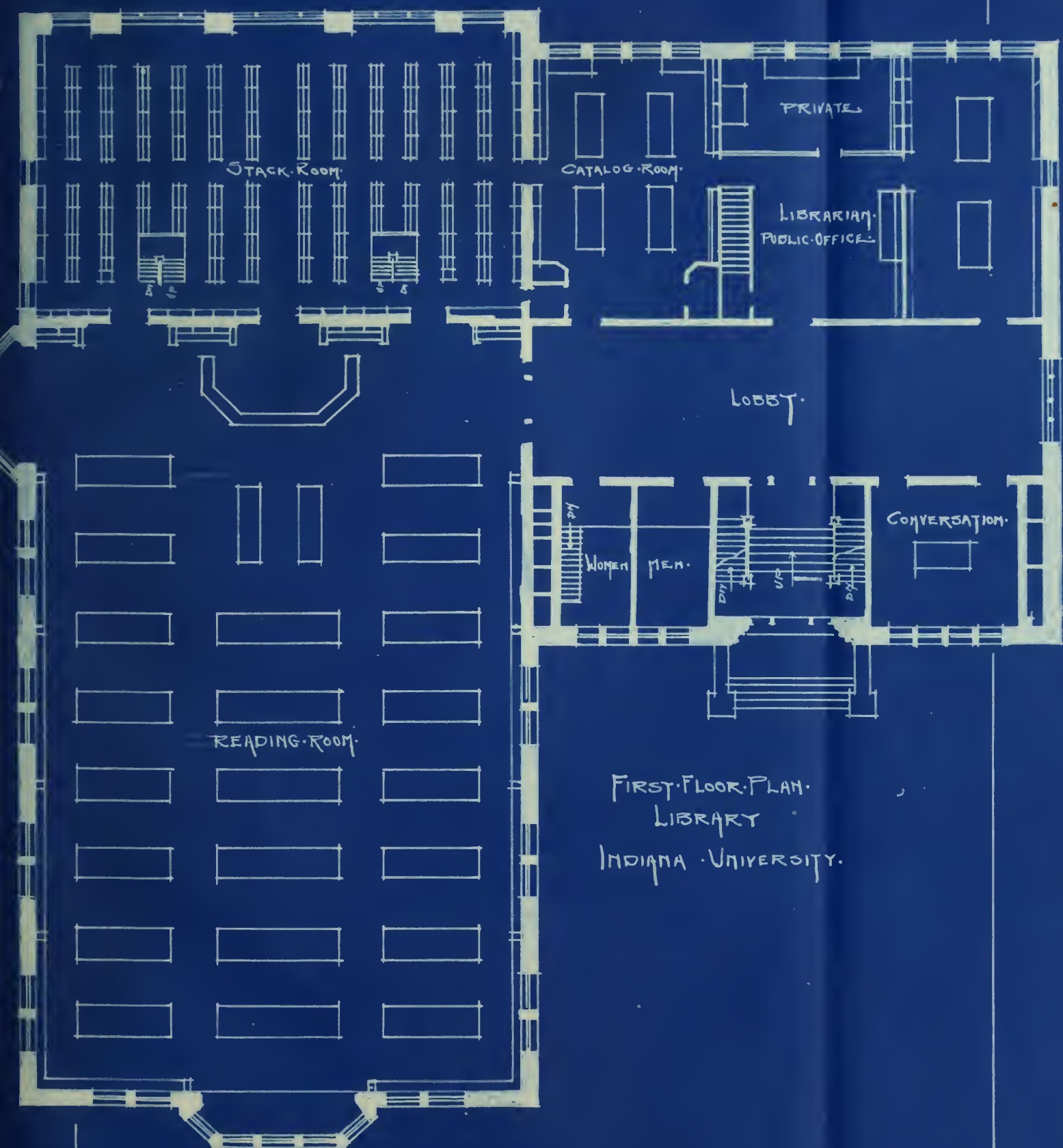
Cataloger's Room:

The cataloger's room is placed on the opposite side of the delivery desk from the librarians office and is directly above the





FIRST FLOOR PLAN
 OBERLIN COLLEGE LIBRARY.



FIRST FLOOR PLAN.
LIBRARY
INDIANA UNIVERSITY.

accession room in the basement, with which it is connected by means of a stair case and book lift.

Other Work Rooms:

A small bindery, an accession room, and an ample room for storage of old magazines, etc., are placed in the basement in close communication with the stack and the administrative offices above.

The unpacking room may be reached directly from the outside of the building by a grade entrance.

THE STACK ROOM:

In modern library building the stack room is necessarily the important feature in many ways, and we will first consider the essentials to a good book stack.

1. Accomodation for books of every variety, size and kind of binding.
2. Shelves easily and quickly adjustable and interchangeable by by any library attendant and readily and compactly stowed a away close at hand when temporarily displaced.
3. Permitting every desirable classification, arrangement and rearrangement of the books at will.
4. Affording free and instant access to any volume at any time.
5. Having not only certain main corridors, stairs, and lifts for direct access to the books and for free communication both laterally and vertically throughout the stack in its several tiers, but readily yielding additional passages anywhere.
6. Proper supports for books on partially filled shelves.
7. Maximum capacity and capability of indefinite extension.
8. All surfaces permanently smooth and rounded to prevent injury to books or papers and protected from corrosion.

9. Fireproof throughout.
10. Thoroughly illuminated by day and night.
11. Naturally clean and readily kept clean and free from accumulated dust.
12. Even temperature and ventilation not only throughout the stack in general, but through the individual shelves and their supports, so that practically the only obstruction to free circulation of air and light is offered by the books themselves.
13. Free, easy, and direct communication at will in any direction throughout the stack for the convenience of the attendants.
14. The fewest separate parts or pieces and the simplest construction consistent with strength and rigidity.

There are a number of forms of book stacks on the market that fill these conditions more or less fully. The type that seems the best to me and the construction of which I wish to describe and illustrate is manufactured by the Snead & Co. Iron Works.

The construction consists simply of cast iron skeleton shelf supports or uprights, spaced the shelf length apart, resting on the foundation and extending from deck to deck to the top of the stack. These partitions are steadied by attachment at the top and bottom to the deck bars, which are the supports of the decks. The deck bars are of steel bolted to the uprights at each deck level, and connecting the rows of uprights. The latter are also connected to each other at the deck levels by flanged bars at right angles to the deck bars. All are connected continuously through the stack, both laterally and longitudinally, from wall to wall, into which they are anchored, thus bracing the uprights at every story and preventing buckling in the lower stories from the weight of the books and decks above.

Expansion.

The library has been planned with regard to future expansion, the stack room being at the rear of the building so that it might be enlarged with the growth of the library.

The accompanying isometric drawing of this form of shelving with the description of the parts will give a clearer idea of the system contemplated.

CAPACITY OF BOOK SHELVING.

In ascertaining the quantity of shelving required to accommodate a certain number of books the character of the books must be duly considered. The following table has been deduced as representative of the different types.

	Vols. per running foot of shelf.	Vols. in single faced 3' section.	Vols. in double-faced 3' section
Law Library	5	105	210
Scientific Library	7	147	294
Reference Library	8	168	336
Circulating Library	10	210	420

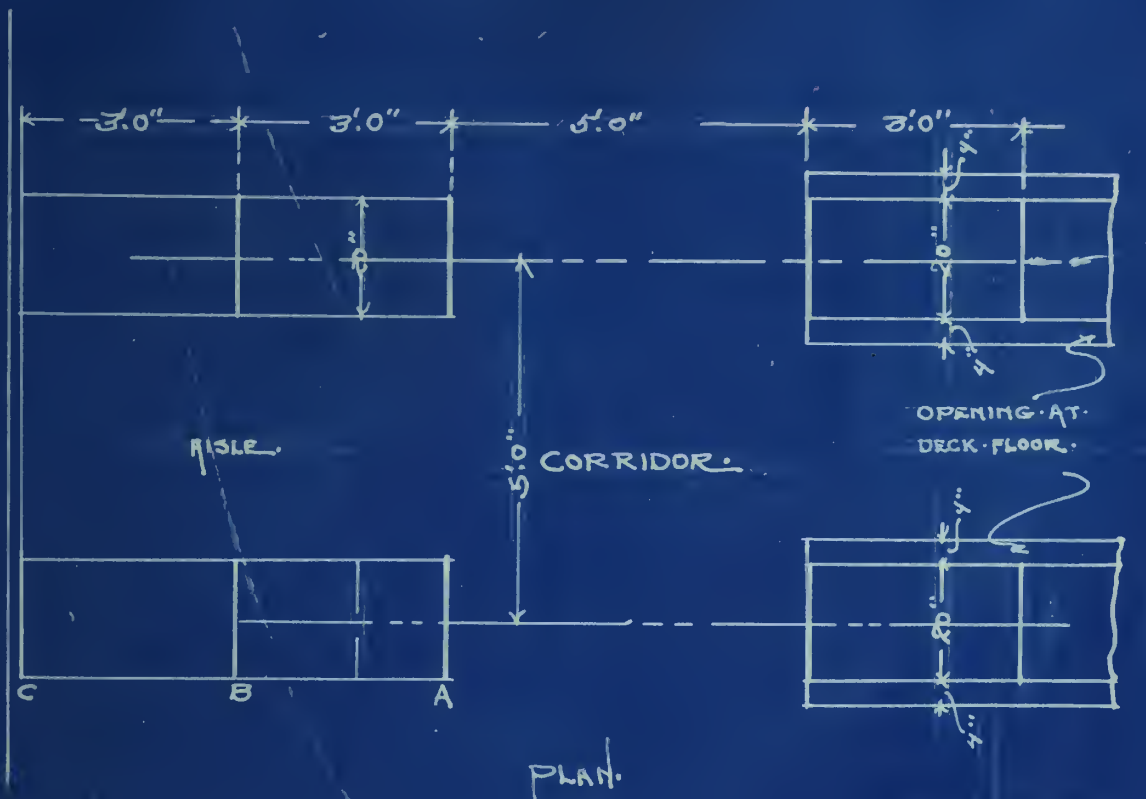
The weights of book stacks and books will be found on the accompanying plan of the stack arrangement with regard to aisles and passages.

THE SHELVING in the seminar and reference rooms is similar to the other shelving except that they are single faced ranges placed against the walls of the rooms.

STAIRS IN STACK ROOM connect each tier of stacks.

BOOK LIFT. A book lift is provided of the dumb waiter type, the car being made of sheet steel operated by electric power with automatic

TABLE OF WEIGHTS OF BOOK STACKS AND DECK FLOORS.



A. RANGE FRONT.
B. SHELF SUPPORT.
C. WALL PIECE.

AVERAGED WEIGHTS.

DECK FLOOR FRAMING.	6 ^{lb} PER SQ. FT. GROSS AREA.
3/4" GLASS FLOORING.	10 ^{lb} NET AREA.
1 1/2" MARBLE.	20 ^{lb}
STACKS & SHELVES.	10 ^{lb} PER CU. FT. OF STACK.
BOOKS.	20 ^{lb}

LIVE LOAD TAKEN AT 40^{lb} PER SQ. FT. NET AREA FOR TOP FLOOR AND
REDUCED 10% FOR EACH FLOOR BELOW.

TABLES OF LOADS ON FOLLOWING SHEETS FOR ABOVE PLAN.

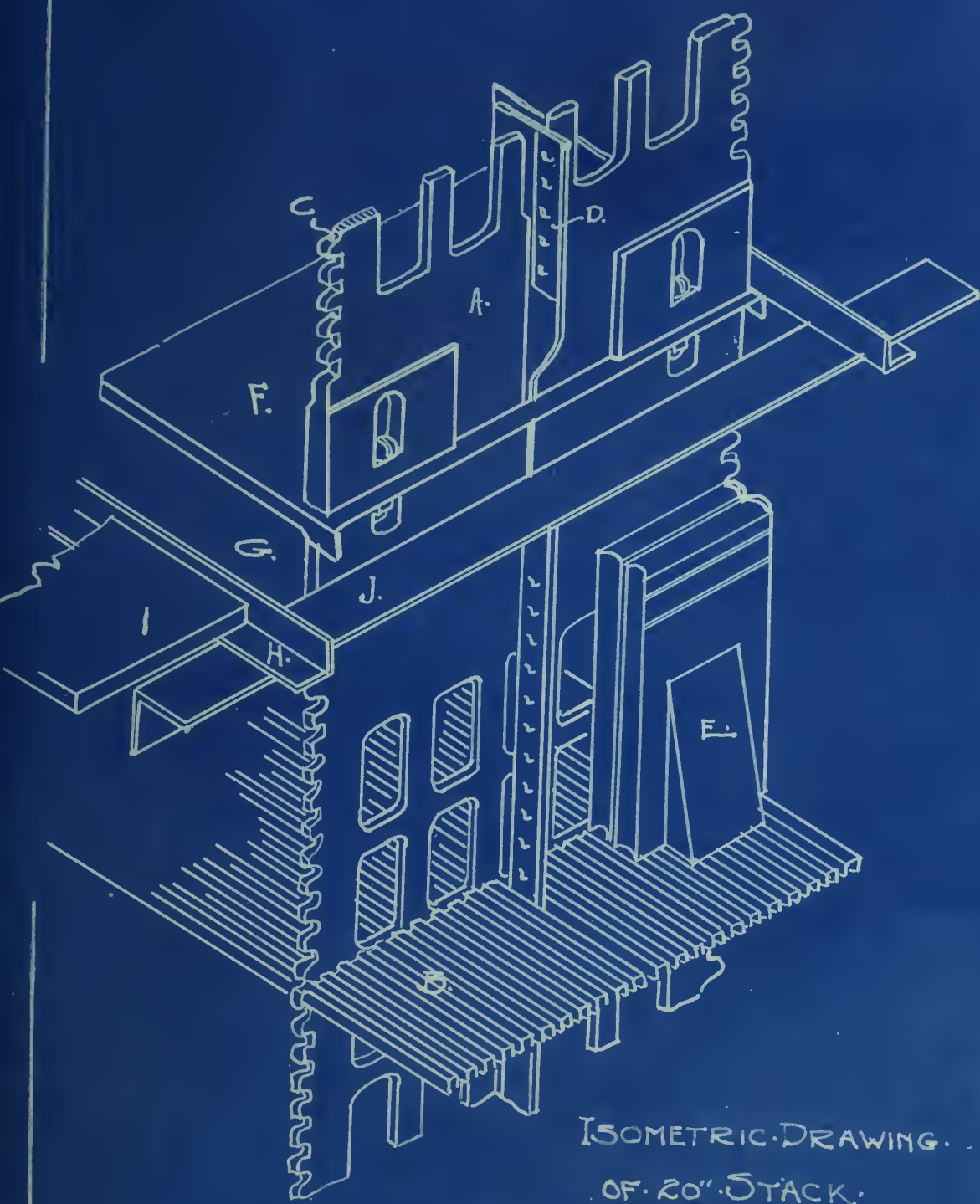
TABLE OF LOADS.
USING $\frac{3}{4}$ " GLASS FLOORING.

TIER.	LOADS IN %.	A.	B.	C.
12TH.	DEAD	770	1190	595
	LIVE.	660	320	160
11	TOTAL FROM ABOVE.	1430	1570	755
	DEAD	770	1190	595
	LIVE.	595	290	145
10	TOTAL	2795	2990	1495
	DEAD	770	1190	595
	LIVE	535	260	130
9	TOTAL	4100	4440	2220
	DEAD.	770	1190	595
	LIVE	480	240	120
8	TOTAL	5350	5870	2935
	DEAD	770	1190	595
	LIVE	435	210	105
7	TOTAL	6555	7270	3635
	DEAD.	770	1190	595
	LIVE.	390	190	95
6	TOTAL	7715	8650	4325
	DEAD	770	1190	595
	LIVE..	350	170	85
5	TOTAL	8835	10010	5005
	DEAD	770	1190	595
	LIVE.	315	150	75
4	TOTAL	9920	11350	5675
	DEAD	770	1190	595
	LIVE	285	140	70
3	TOTAL	10975	12680	6340
	DEAD	770	1190	595
	LIVE	255	130	65
2	TOTAL	12000	14000	7000
	DEAD.	770	1190	595
	LIVE	230	110	55
1.	TOTAL	13000	15300	7650.

TABLE OF LOADS.

USING 1 1/2" MARBLE FLOORING.

TIER	LOAD IN. X	A.	B.	C.
12TH.	DEAD.	940	1270	635
	LIVE.	660	320	160
11	TOTAL FROM ABOVE	1600	1590	795
	DEAD	940	1270	635
	LIVE	595	290	145
10	TOTAL	3135	3150	1570
	DEAD	940	1270	635
	LIVE	535	260	130
9	TOTAL	4610	4680	2340
	DEAD	940	1270	635
	LIVE	480	240	120
8	TOTAL	6030	6190	3095
	DEAD	940	1270	635
	LIVE	435	210	105
7	TOTAL	7405	7670	3835
	DEAD	940	1270	635
	LIVE	390	190	95
6	TOTAL	8735	9130	4365
	DEAD	940	1270	635
	LIVE	350	170	85
5	TOTAL	10025	10570	5285
	DEAD	940	1270	635
	LIVE	315	150	75
4	TOTAL	11280	11990	5995
	DEAD	940	1270	635
	LIVE	285	130	70
3	TOTAL	12505	13400	6700
	DEAD	940	1270	635
	LIVE	255	130	65
2	TOTAL	13700	14800	7400
	DEAD	940	1270	635
	LIVE	230	110	55
1	TOTAL	14870.	16180	8090.



ISOMETRIC DRAWING.
OF 20" STACK.

SEE NEXT PAGE FOR KEY.



push button control. With this arrangement the car may be sent to or brought from any landing by pushing the proper button and it stops automatically at the desired landing.

Key To Isometric Drawing of Stack.

- A. Open work shelf support, permitting free circulation of air and moderate light throughout the stack. It is only 7/16" thick, giving a maximum strength for supporting its load without deflection.
- B. Skeleton cold rolled steel adjustable shelf, also permitting free circulation of air throughout the stack; of minimum weight and maximum strength for supporting its load without deflection.
- C. Tooth for supporting fronts of shelves - the shelves of adjoining compartments can rest on the same tooth, permitting a thin support and doing away with lost space.
- D. Interlocking device or horn, securing the shelf in its place and preventing its dislodgment when in position.
- E. Book support, a rigid adjustable brace for books on partially filled shelves.
- F. Diaphragm forming bottom shelf and a continuous brace at deck floor throughout the stack, also a fire, dust and water stop.
- G. Deck slit generally 4 to 5" wide for circulation of air from deck to deck and for communication between decks.
- H. Curb angle for receiving floor of marble or glass and for prevention of the injury of books on bottom shelves by floor mop, book truck, or the feet of attendant.
- I. Deck floor of marble or glass or any other suitable material.
- J. Deck floor girder.

The stack room in this problem is designed to contain 250000 volumes.

Delivery Room which may be said to belong to the administrative part of the library is situated directly in front of the stack room. The Card Catalogs are placed at either side of the loan desk.

OTHER ROOMS.

Main Reading Room:

The main reading room is the central feature of the building, a long narrow room seating 300 readers. Each reader is allowed 18 square feet of floor space.

The room is three stories high and is lighted by large clerestory windows above the alcoves at either side. These windows afford ample light in the day time and at night electric fixtures placed on the reading tables are used.

The tables are arranged in two rows running lengthwise of the room and are spaced 5 feet front to front.

Systems of Seatings:

The tables will seat twelve students, each seat being allowed two and one half feet of table top and these are separated by a wooden parting strip rising about three inches above the table top.

Periodical Room:

The periodical room is two stories high and will accommodate 140 readers.

Storing Periodicals.

Book cases extend entirely around the periodical room for the storage of the bound numbers of magazines.

The current numbers of periodicals are placed in convenient forms of wall racks and magazines are placed in magazine hold-

ers and arranged on the tables for reference.

Reference Rooms:

The reference rooms are arranged in alcoves along the sides of the reading room and are provided with wall shelving.

Seminar Rooms:

Seminar rooms for advanced students have been provided, 15 in number, 5 on a floor. They are provided as the reference rooms with wall shelving and study tables. A separate entrance has been arranged for seminar students connecting with a hall that leads to stairways for the different stories.

Special Collections:

The story above the periodical room is devoted to special collections that may be presented to the library.

Cloak Rooms:

Cloak rooms are provided at either side of the main vestibule and these connect with toilets beneath in the basement.

Library School:

As has already been mentioned, part of the work rooms are in the basement. The greater part of the remaining space has been set aside for a library school, providing offices for instructors, class and lecture rooms and toilets.

Janitors Room:

The janitors quarters are in the basement and a room is also provided for forced ventilation of the building.

The following schedule gives the floor areas of the different departments. These sizes have been deduced as nearly as possible for a comparison of other University libraries, but this is only a very rough approximation due to the great variance in the different li-

FLOOR SPACE IN SQUARE FEET
 ASSIGNED TO VARIOUS DEPARTMENTS IN VARIOUS UNIVERSITIES.

UNIVERSITY	VOLUMES	READING RM.	REFERENCE	PERIODICAL	LIBRARIAN	ASSISTANTS	CATALOGER	UNPACKING	ACCESSION	BINDERY	SEMINAR
OBERLIN	177000	7204		1200	400	300	625	500	625	500	6400
INDIANA	60000	6000			280	400	700	400			6700
PARLHAM	20000	3000			250		400	300			2150
MARIETTA	60000	1700	1700		300	250	200	600	600		1500
WASHBURGH	20000	1350	1000		180		200	300			3100
COLUMBIA	420000	5000			400		700	640		625	2352
NEW YORK	72000	2290			350		680	520		570	4636
LEHIGH	125000	2000			290		370	300	400		
OHIO STATE	73600	6000			380	500	540	400			4780
PENNA.	285000	8000	3800		400		580	470			
LELAND STANFORD	107000	4400	1500	1075	365		400	620	500		3200
NEBRASKA	82000	4900			300	460	280	500			
VANDERBILT	30000	4600	1100	2000	320	320	600	520			6100
SYRACUSE	70000	4200		2100	500	300	500	350		350	11400

braries.

I have incorporated in my thesis a table of University libraries with the floor space assigned to each department as nearly as I could determine. As to establishing a definite ratio regarding different rooms, in different buildings table is not altogether satisfactory.

SCHEDULE OF ROOMS.

First Floor.

Stack Room	2590 sq.ft.
Reading Room	5400
Reference Rooms	1200
Periodical Room	2100
Seminar Rooms	2100
Librarians Office	500
Assistant	260
Delivery Desk .	
Card Catalog	700
Working Space .	
Conversation Room	260
Dictionaries	260
Corriders and Stairs	2000
Vestibule and Coat Rooms	900

Second Floor.

Stack Room	2590 sq.ft.
Seminar Rooms	2100
Corriders and Stairs	2000
Gallery over Working Space	700

Third Floor.

Seminar Rooms	2100
---------------	------

Special Collections	2100 sq. ft.
Corridors and Stairs	2000
Stack Room	2590
Basement Floor	
Stack Room	2590
Bindery	510
Accession Room	510
Unpacking Room	1100
Storage	1680
Library School	
Class Rooms	4200
Offices	1520
Toilets	800
Janitors Quarters	260
Fan Room	1300

List of Drawings.

Front Elevation

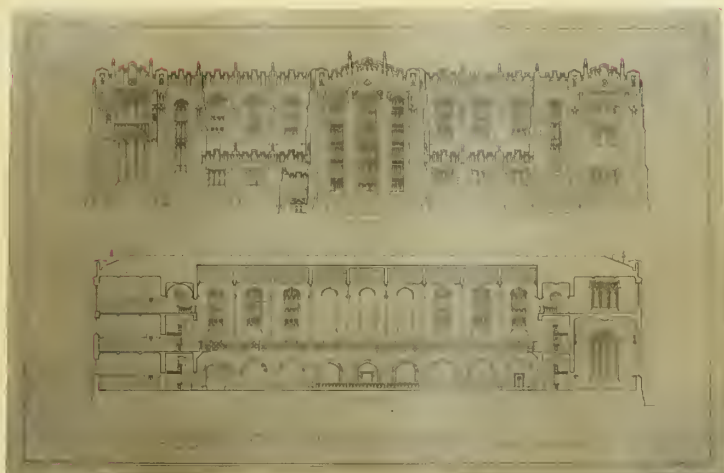
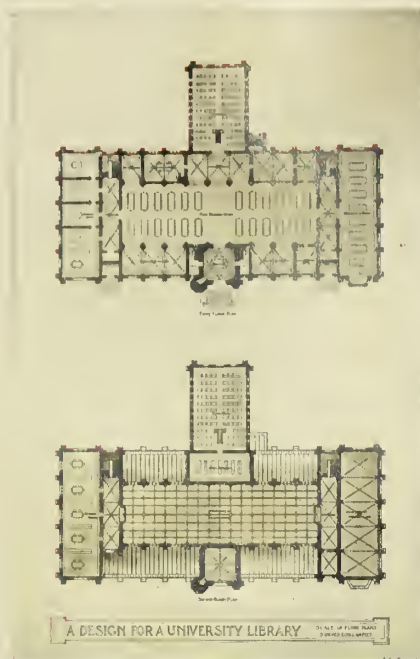
Rear Elevation

Longitudinal Section

First Floor Plan

Second Floor Plan

Photographs of these drawings will be found on the following page.







UNIVERSITY OF ILLINOIS-URBANA



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